NISTTech

Method for Combinatorially Measuring Adhesion Strength

Rapid screening of adhesives to provide quantitative characterization of polymer interfaces

Description

This technique completes thousands of individual adhesion tests and analyses results in a matter of minutes. It determines reliable, absolute, quantitative measurements of polymer adhesion to build a knowledge base for future molecular engineering of polymer interfaces. This method qualitatively maps relative adhesive strengths across an array and allows for quick and efficient focus of quantitative analysis to areas of greatest interest to a specific application. Adhesive samples are positioned across a specialized lens array and tested against a substrate of choice. Statistical error is minimized since the processing and pre-test environmental conditions of each adhesion measurement site are uniform.

Images

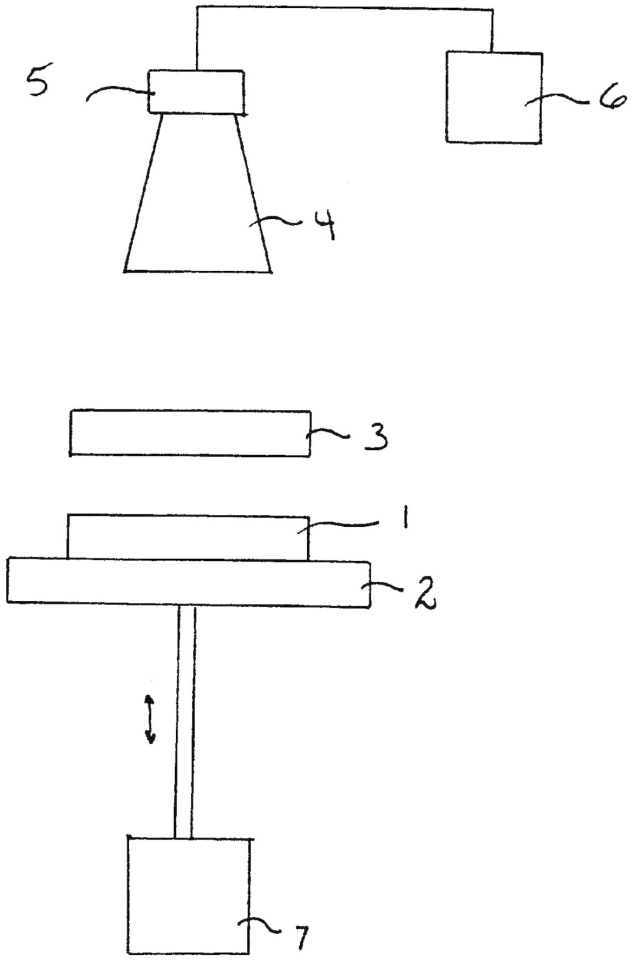

Figure 1

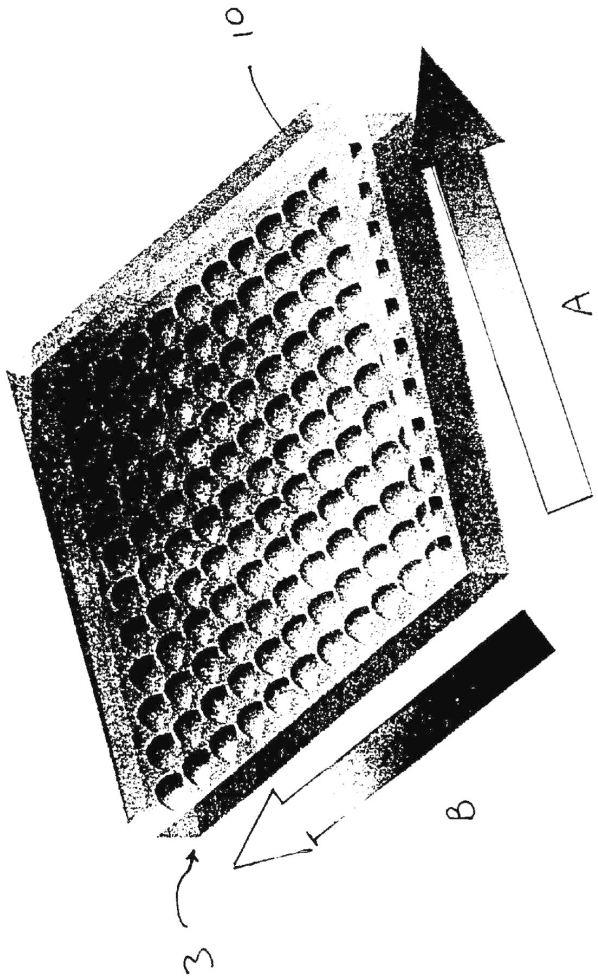

Figure 3

Applications

- **Electronic packaging**
  Selects the best polymeric materials as thermal insulator layers, electrical insulator layers, or as binders between two non-adhesive material layers.
- **Biomedical devices**
  Provides information to properly engineer polymer coatings to minimize the adhesion between the polymer and common, targeted or suspected contaminants; optimize adhesion for the operating conditions or environment.
- **Pressure sensitive adhesives, coatings and paints**
  Improves the design and formulations; identifies blends that possess optimal compositions that withstand different environmental conditions.
- **Automotive industry**
  Identifies the preferred polymer candidates for adhesives used in an automobile's interior components.

Advantages

- **Saves time**
  Quickly identifies trends that can be used to design more appropriate materials.
- **Greater reliability**
  Controls environmental features for all samples.
- **Broad range of applications**
  Applies to polymer-to-polymer interfaces, polymer-to-metal interfaces, and polymer-to-ceramic interfaces and is not limited to any specific polymer, metal or ceramic or any type of polymer, metal or ceramic.

Abstract

A method of measuring the adhesive strength of polymer materials that are arranged in a combinatorial library which involves providing a lens array having a plurality of individual lens elements on a surface thereof and a substrate. A pattern of different polymer materials, processing variables or environmental conditions is applied to either the individual lens elements of the lens array or to the substrate. The individual lens elements of the lens array are brought into contact with the substrate and, as the lens array and substrate are separated from one another, changes in contact area of the individual lens elements with the substrate are monitored and used to calculate the adhesive strength of the polymer.

Citations

1. R. Song, M.Y.M. Chiang, A.J. Crosby, A. Karim, E.J. Amis, and N. Eidelman. Combinatorial Peel Tests for the Characterization of Adhesion Behavior of Polymeric Films. Science Direct. Posted online January 13, 2005.

References

- U.S. Patent # 6,813,958

Status of Availability

This invention is available for licensing.

Last Modified: 03/12/2010